The first edition, written originally in English and translated into Portuguese by Dr. Antonio de Barros Barreto, appeared in 1906. The many additions which appear in this second edition were written directly in Portuguese by Dr. Branner, who, to his other accomplishments, adds a sufficient mastery of the Portuguese language to have become also the author of a Portuguese-English grammar which, like the *Geologia Elementar*, is recognized as a standard.

R. T. C.

Geologische Beobachtungen in Spitzbergen. Ergebnisse der W. Filschnerschen Vorexpedition nach Spitzbergen 1910. By PROFESSOR H. PHILIPP. Ergänzungsheft Nr. 179 zu *Petermanns Mitteilungen*. Gotha: Justus Perthes, 1914. Pp. 46, figs. 4.

The rocks exposed are of Jurassic and Triassic age. The former contain coal and fossiliferous beds carrying cyathophylloid corals. The interior of the island is an arctic desert. As in deserts of more temperate zones, the changes of temperature due to insolation are so great that the accumulation of scree is excessive. So much rubble falls that in some cases the mountains are completely girdled with débris even to their tops; so much so that the speed of further destruction of the mountain is greatly decreased. Built in this manner there are everywhere great débris terraces.

The west coast is bordered by a mountain chain which precipitates the moisture from the sea breezes; this makes the interior a true desert, a *hamada*. Gravel floors and dreikanter are characteristically developed. Deflation is marked, but no sand dunes are formed because the rock dust is carried onto bordering glaciers and deported. Vegetation is practically wanting; only a few valley bottoms, in the rôle of oases, become green during the short summer. The author calls this region an "arctic" desert, in distinction from the usual polar desert.

Generally the island is ice covered. The covering is controlled by the physiography; the conformity of the glacial capping to the underlying land surface is the characteristic of the typical Spitzbergen ice field. In different regions the climatic control gives rise to valley, plateau, or cap ice and slope glaciers, or to combinations of these. Slope ice forms troughs and kars. The slopes bordering the valley glacier are ice covered to the divide top. This slope ice works down the sides at right angles to the axis of the valley and to the flow of the valley glacier. It works headward by bergschrund action, while the valley

glacier deepens its bed by corrasion, until there is a decided reverse curve in the profile of the slope. The upper part is concave upward, the lower part is a convex ridge near the rim of the channel cut by the valley glacier. With decrease in abundance of snow, the slope glaciers may dwindle to bowls of snow (*wanner* and *mulden*), and by selective erosion they may become ridge-cutting cirques.

Glacial movement is essentially along shearing planes; these planes are parallel to the great friction of the glacier bed and are for that reason approximately trough-shaped. The glacier's whole movement is accomplished by means of a multitude of such planes. The planes show at the base and edges of the glaciers; on the average they are from one to two meters apart. Thus it results that, in proportion to the total amount of movement in a glacier, the shearing along each plane is very small. The blue bands are due to the regelation of the shear planes after they have been melted by the over-pressure or by friction.

Ice crystals are found in two types, those precipitated from the atmosphere and those formed by freezing waters. In one place a 20-cm. layer of névé consisted of vertical standing prisms; they were $\frac{1}{2}$–1 cm. in diameter and 10 cm. long arranged in two layers of 10-cm. crystals. In the higher parts of the snow fields, beautiful rosettes of crystals bedeck the snow surfaces. The diameter of the rosettes varies from 5 to 20 cm.

Most of the evidence of Pleistocene glaciation has been obliterated by the action of insolation and frost. From floral remains there seems to have been a climate warmer by 2.5–3° C. preceding a recent uplift of about 400 feet.

T. T. Q.

Kanawha County. By CHARLES E. KREBS. West Virginia Geological Survey, County Reports, 1914. Pp. 679, pls. 32, figs. 14.

County reports have been completed for about one-half the counties of this state. Kanawha County is the first to be treated in a separate volume and its importance is such as to justify a full report. It is among the leading counties of the state in production of coal, and is rich in petroleum and building-material.

This report follows the general plan adopted in previous reports. Part I treats of the historical and industrial development and physiography. Part II takes up the stratigraphy in detail. About forty general sections of Carboniferous outcrops are given with several times that number of partial sections.